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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE

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A SCIENCE SERVICE PUBLICATION

ELECTRONICS

"Fly" Unbuilt Planes

Analogue computer, now checking airplane designs, could have, if it had existed then, told first pilot to break sound barrier that his plane would not disintegrate.

► NOW AN electronic "brain" can "fly" unbuilt airplanes. The brain will tell engineers in advance whether the aeronautical design of a new plane is sound. If faulty, the design can be re-worked and checked by the brain until the best design has been obtained.

The analogue computer's component parts, existing as separate entities in 1946, helped Boeing get the B-52 Stratofortress and the B-47 Stratojet into the sky for the Air Force.

Without the computer, some of the Air Force's new missiles would still be in design stages today, said Edward R. Baugh, manager of Boeing's electronic devices.

The electronic device, if it had existed then, could have predicted in advance that the experimental Bell XS-1 was not going to disintegrate when Maj. Charles E. Yeager, then an Air Force captain, rammed the tiny plane through the sonic barrier on his history-making flight Oct. 17, 1947.

This prediction might have comforted Maj. Yeager somewhat. He knew an English plane had disintegrated in an apparent attempt to crack the sonic barrier. The pilot was killed.

The electronic analogue computer was displayed at the Eastern Joint Computer Conference in Washington sponsored by the American Institute of Electrical Engineers, the Institute of Radio Engineers and the Association for Computing Machinery.

Models of an airborne digital computer

have been flight tested in a C-47 aircraft. W. B. Hebenstreit, an official of Hughes Research and Development Laboratories, said the pint-sized computers have been used to control the airplane automatically through an autopilot. The flight was smooth and accurate.

The digital computer was linked to the autopilot through a coupler. The coupler took the output from the computer and supplied heading-angle corrections to the autopilot. Flight tests included automatic dead-reckoning and programmed flight over a selected course.

Although it occupies only two cubic feet of space, as compared to models that often fill a substantial part of a large room, the little computer works rapidly. Its computing speed and capacity are about half that of its big brothers.

The Burroughs Corporation revealed two new devices: a high-speed smudge-free printer and a "word punch" that prepares tape for digital computers.

The printer is the "answer end" of a laboratory computer. Tiny hot pins jab out of a holder to melt a carbon coating to the answer tape. The pins form any of 16 characters, spelling them off at 30 characters a second.

The word punch is a desk-size device with which an office girl can prepare a tape for digital computers. It is believed that the new device will cut errors 60%.

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FORESTRY

Christmas Tree Farms

► THE BEST part of Christmas for many farmers is the profit they make growing Christmas trees on their poorest land. The estimated total retail value of the Christmas tree industry this year is \$50,000,000.

The United States uses about 30,000,000 trees each Christmas, nearly a third of them imported from Canada. Of the trees cut in this country, small farms yield 44%.

Most of the trees, a little over 90%, come from natural timber cuttings. The remainder are grown on "Christmas tree farms," a profitable sideline farmers all over the country are discovering.

Poor land is best for this kind of tree farming, since it slows tree growth to yield a denser, more attractive tree. A tree that grows slowly has its branches close together, giving it a compact appearance.

By the middle of last month, most Christmas trees had been cut, sorted and

graded and started for the markets. To keep the tree in good condition longer, cutting is timed to come after the first frost. Cutting age is usually 10 to 25 years.

The most popular trees for Christmas use are balsam fir and Douglas fir, which together account for 57% of all the trees. Other popular varieties are black spruce, eastern red cedar and white spruce. Balsam fir is grown in the Midwest and East and Douglas fir in the West.

Spruce and fir trees have short, upright needles on their branches and twigs. Each needle is attached to the twig individually, unlike pine trees which have several needles joined together.

Christmas tree plantations have been spreading over the nation for 30 years. Foresters estimate that farmers can grow, at a total cost of 25 to 28 cents, a tree that will sell for 50 cents. This profit, coupled with

the use of poor land, makes the trees an attractive sideline.

In order to give their trees the cone-shape preferred by most buyers, plantation owners shape their trees each year with pruning shears. This pruning also serves to make the trees more compact.

Foresters recommend that Christmas trees be kept in water in a cool place and sprinkled with water frequently before they are put up for decoration.

When the needles of a tree start falling, it is time to throw it away. This indicates the tree has dried out and become a serious fire hazard.

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VIROLOGY

Diamond-Shaped Crystal In Germs Discovered

► DISCOVERY OF diamond-shaped crystals in the spores of a bacillus that makes certain insects sick is giving scientists a new mystery.

Whether these crystals contain a virus or a phage, or whether their formation is a genetic characteristic related to formation of an insect poison are problems now awaiting solution, Dr. C. L. Hannay of Science Service Laboratory, London, Ont., Canada, points out in *Nature* (Nov. 28).

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MEDICINE

Inhale Vitamin Instead Of Getting "Shots"

► PERNICIOUS ANEMIA patients can now take their vitamin B-12 by inhaling it, like steam or nose drops, instead of getting "shots" of the vitamin into their muscles.

This new method for giving vitamin treatment was announced by Dr. Raymond W. Monto of the Henry Ford Hospital, Detroit, at a regional meeting of the American College of Physicians held at the University of Michigan.

Vitamin B-12 effectively controls pernicious anemia, but frequently these patients have a stomach defect which prevents them from absorbing the vitamin if they take it in tablets like pills. Therefore it has become routine to inject the vitamin hypodermically into the muscles.

"Injection of vitamin B-12 requires a physician, and since the therapy [treatment], in order to be effective, must be continuous, the routine is often tiresome and expensive for the patient," Dr. Monto reported.

The need was for an "effective, economical and safe mode of treatment for pernicious anemia," the doctor said.

The method has been developed. It is the simple inhalation of vitamin B-12 in crystalline form through the nose, much like steam or nose drops. The sufferer of pernicious anemia may now side-step the needle and inhale the vitamin after pre-irrigation.

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CYTOLOGY

Way Life Is Handed On

Scientists have new key to duplication of life patterns within cells in proposed chemical structure for DNA, desoxyribonucleic acid. Suggestion has implications for cancer.

► ONE OF the fundamental problems of living matter is the way life is handed on, that is, how the molecules that carry on heredity are duplicated within the cells. It seems to be near solution through a new chemical structure proposed for the substance that is most essential in the dividing cells involved in life of all varieties.

This sort of "chemical essence of life" is DNA, the full name of which is desoxyribonucleic acid. Its importance within living cells is today undisputed. The stature of this chemical has grown in the past year or two.

A suggested structure for this chemical, telling how the molecules that compose it are put together, is creating about as much interest and hopeful speculation in chemistry and biology as anything that has happened in many months.

For the mystery being solved is not alone how the stream of life of human beings, animals, plants and all other living things is carried on. It involves the multiplication of all cells and units of living matter. It is therefore basic to disease, such as cancer, which is unruly multiplication of cells. It may tell how unconquered viruses, recently photographed with the electron microscope, proliferate, which should be a step toward keeping them in hand.

DNA's architects are two scientists working in the famous Cavendish Laboratory at Cambridge University, England, where so many important discoveries have been made over the decades. One of them is Dr. J. D. Watson, who has been working on a fellowship from the National Foundation for Infantile Paralysis supported by the March of Dimes in the United States. The other is Dr. F. H. C. Crick, who has collaborated on the mathematical theory that protein molecules are wound into the shape of a helix or coiled spring.

These two scientists are a part of Britain's Medical Council unit "for the study of the molecular structure of biological systems."

They have succeeded in working out a manner of construction of DNA that suggests how it can accomplish an exact duplication of itself.

This is something new. It may solve a major puzzle. DNA is found in all dividing cells, largely if not entirely in the nucleus. It is an essential constituent of the chromosomes, the parts of the cell in which the stuff of heredity is located. Many lines of evidence indicate that DNA is the carrier of a part, if not all, of the genetic specificity of the chromosomes. Thus it is the chemical of the genes, the actual trans-

mitting agent of all characteristics of the parents to their offspring. It is one of the world's most important substances.

Incidentally, DNA is desoxyribonucleic acid in the United States, while the British drop the "s" and write it deoxyribonucleic acid.

Far too minute ever to be seen with the most powerful microscopes, X-ray crystal studies give evidence to support the theoretical and mathematical ideas suggested.

The DNA molecule is a long chain. Its backbone consists of a regular alternation of sugar and phosphate groups. To each sugar is attached irregularly a nitrogenous base, which can be of four different types, two of which are purines, called adenine and guanine, and the others are pyrimidines, called thymine and cytosine. The unit consisting of phosphate, sugar and base is called a nucleotide.

The structure has two chains both coiled around a common axis of the fiber. These two chains are held together by hydrogen bonds between the bases, and the bases are joined together in pairs. One member of the pair must be a purine and the other a pyrimidine in order to bridge the two chains.

Any sequence of pairs of the bases can fit into the structure and, in a long molecule, many different permutations are possible. The Cavendish Laboratory scientists suggest that the precise sequence of the bases is the code which carries the genetical information.

One of the chains is the complement of the other. This feature suggests how the DNA molecule might duplicate itself.

In the process of duplication, it is visualized that the two chains unwind and separate. Each chain then acts as the model or template for the formation on itself of a new companion chain. There are two pairs of chains where there was only one pair before. There has been exact duplication, carrying the qualities of the original structure.

Enthusiastically, the scientists speculate on just how much these supposed happenings can explain. The unusual changes in heredity—are they due to one of the bases occasionally occurring in a less likely form? What makes the pair of chains unwind and separate? What is the chemical origin of the stuff of the crystal?

This discussion is part of the great and inspiring push toward understanding the complexities of the materials of life. Dr. Linus Pauling and Dr. Robert B. Corey of the California Institute of Technology are

solving the related problems of the structure of individual kinds of protein materials. The researches and the ideas of one group aid those of another.

Almost every issue of leading scientific journals adds new facts and theories. The most important chemicals of life are being better understood and man reaches for the very mystery of life.

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TECHNOLOGY

Ash from Volcano Makes Cement for Construction

► WHEN A New Guinea volcano erupted violently in 1951, it produced ash that can be used in making cement useful for construction purposes.

Two specialists of the Australian government's scientific and research organization, K. M. Alexander and H. E. Vivian, report in *Nature* (Nov. 28) results of tests that show volcanic ashes from Mt. Lamington's recent explosion, when combined with lime, can be used in mass concrete work.

The ash is what is called pozzolanic material. Tests on the ash blended with portland cement are also being made.

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MEDICINE

New Miners' Disease Hits Lungs and Joints

► DISCOVERY THAT a combination of rheumatism and a new lung condition, making up what may be a new kind of disease, hits coal miners is announced by Medical Research Council scientists in the *British Medical Journal* (Dec. 5).

The lung condition, which the scientists term "rheumatoid lung lesion," shows quite a different X-ray picture in some respects from that of progressive massive fibrosis in the pneumoconiosis which doctors are accustomed to seeing in coal miners.

It can develop several years before, at the same time as, or several years after the arthritis starts.

The arthritis affects more than half the patients with the peculiar lung condition, whereas arthritis is found in only three out of every 100 miners with the more usual lung disease, progressive massive fibrosis. No cases of arthritis were found in miners without any lung disease or in those with only simple pneumoconiosis.

Best explanation for the new combination of diseases, the scientists think, is that there may be a particular type of tissue reaction to dust and tuberculosis in the lungs of miners who are predisposed to rheumatoid arthritis.

The scientists who made the study in the Rhondda Fach, a South Wales mining valley, are Drs. W. E. Miall, Anthony Caplan, A. L. Cochrane and G. S. Kilpatrick, and P. D. Oldham of Cardiff, Wales, and London.

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GENERAL SCIENCE

Private Research Best

Annual report of Carnegie Institution of Washington notes progress in astronomy, formation of earth's rocks in the laboratory, photosynthesis and human embryology.

► THE GREAT need for fundamental scientific research can best be met by privately endowed research institutions, Dr. Vannevar Bush, president of the Carnegie Institution of Washington, said in his annual report to the Institution's trustees.

Recent trends in research projects financed by the government and foundations at universities have led some to the mistaken conclusion that research institutions are "obsolete," Dr. Bush commented.

In the field of fundamental research, "the research institution is paramount," he declared.

Dr. Bush pointed out that research institutions were not necessarily isolated and could take advantage of the ideas of young scientists. Isolation and scientific fixity can be successfully avoided by the research institution, he said.

During the war the federal government entered the field of scientific research by supporting research projects. This lead has been partly followed by the foundations. Project research, however, is "far better adapted to applied research than to fundamental research," Dr. Bush said.

"The foundations here have to some extent missed an opportunity," he continued. "As the government entered strongly into scientific research, they moved out. If they had moved into basic research, they might have preserved a balance."

The research institution gathers scientists of genius who can work with other scientists in "a broad program for progress," Dr. Bush said. This kind of "team" research, free from the distractions of the university, is best done by private research institutions, he declared.

Dr. Bush summarized the research accomplishments of the Institution in the past year. He called attention to studies on the magnetic field of the sun, the formation of granite rocks, the chemical aspects of growing bacteria, photosynthesis and human embryology.

Earliest Human Embryos

Discovery of the earliest human twin embryos scientists have so far seen was reported by Dr. George W. Corner, director of the Institution's department of embryology located at Baltimore.

These earliest beginnings of human twins are 17 days old, counting from the time of conception. They have been identified by Dr. Chester H. Heuser as identical twins.

They are particularly valuable, Dr. Corner points out, because they give in-

disputable proof that single egg twins, or identical twins, can develop in one of the ways that scientists have believed possible on the evidence of later stages of twin development.

This is by formation inside a single blastocyst of two embryonic areas, each of which becomes a separate embryo. The blastocyst is the stage of the embryo which follows cleavage, when the cells are arranged in a single layer to form a hollow sphere.

Algae-Enriched Foods

Algae rich in protein can be added to soups, breads, jelly rolls, noodles and ice cream in significant amounts and the foods still are pleasant to eat.

Chlorella, the one-celled plant, is being widely investigated as a new food source, but little of it has actually been eaten. The Institution reports taste tests of a Japan-produced *Chlorella ellipsoidea* to some foods at its Stanford, Calif., department of plant biology.

"Highly palatable" was the verdict of the testers who had Japanese, American and European backgrounds. Prof. and Mrs. Hiroshi Tamiya, who made the tests, found the foods were improved in taste and the enriched breads and ice cream were particularly good.

Direct addition of *Chlorella* to food seems feasible, the investigators concluded.

Jupiter's Atmosphere

Jupiter's atmosphere is made up largely of hydrogen and helium, not methane and ammonia as was previously thought.

Dr. William A. Baum of the Mount Wilson and Palomar Observatories and Dr. A. D. Code of the Washburn Observatory, Madison, Wis., have obtained the first direct observational evidence concerning what gases compose Jupiter's atmosphere. These are hydrogen and helium, they found from light curves of the gases composing the outer layers of Jupiter's atmosphere. The heavier gases, such as nitrogen and oxygen, that make up the earth's atmosphere are therefore believed to be almost absent on Jupiter.

Drs. Baum and Code made their observations when Jupiter eclipsed a bright star, Sigma Arietis, noting the rate at which light from the star was dimmed, then finally extinguished by the planet. To catch the star's disappearance with the 60-inch

telescope, they used a photomultiplier, a sensitive instrument that steps up the star's faint light to record it electrically.

Drs. Edison Pettit and Robert S. Richardson, also of the Mount Wilson and Palomar Observatories, took motion pictures of the star's eclipse at the time. They found "remarkable variations" in the brightness of the star about 50 seconds before it finally disappeared. These were due, they believe, to turbulence in Jupiter's atmosphere. Such marked fluctuations were also found with the photomultiplier.

The dimming and gradual disappearance were caused by the spreading of the star's

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light as it was refracted by gases in Jupiter's outer atmosphere. A dense atmosphere would have caused the starlight to dim rather rapidly, but the actual observations showed that it faded out quite gradually.

The figure of 3.3 for the mean molecular weight of Jupiter's atmosphere agrees substantially with an estimate based on a study of Uranus and Neptune that showed that helium is about three times more abundant than hydrogen on those planets. If Jupiter had the same ratio, its mean molecular weight would be an estimated 3.5.

The findings of the two astronomers, at the present time, can be no more specific than that helium and hydrogen account for most of Jupiter's atmosphere. They do not indicate how much of each gas is present or what other elements may exist there.

Bacterial Cell Adapts

Flexibility in the way a bacterial cell can adapt its life cycle to changing conditions is the secret of its survival. This conclusion is reported from researches carried out at the Carnegie Institution of Washington's department of terrestrial magnetism.

Usually the bacterium *E. coli* builds up amino acids according to the cycle discovered by Dr. Hans Adolf Krebs, Nobelist in medicine of this year. But under certain circumstances the organism alters the chemistry of this reaction. Instead of building up amino acids, the bacterium changes the Krebs cycle to a mechanism of oxidation. These changes have been followed by feeding the bacterial colony substances containing radioactive carbon.

Ancient Maya Religion

Excavation at Mayapan, ancient city of the Maya Indians in Mexico, indicates the possibility that Maya civilization was turning from public religion to a more private worship before the Spanish Conquest, Dr. H. E. D. Pollock, director of the Institution's department of archaeology, reports.

Evidence of the religious change includes fragments of human-effigy incense burners, apparently household idols, found in the shrine room of an excavated dwelling. There is also evidence that dwellings were encroaching on ceremonial areas during the last period of the city, upon which excavation began this year.

A study of grave sites in the area, however, shows that human sacrifice was still practiced in the late period of the city. Spanish observers writing at the time of the conquest also support the theory that Maya religious practices were changing during the last period of the civilization.

Dr. Pollock said that the work at the site has not advanced enough yet to determine the growth and development of the city plan. All the buildings studied so far seem to belong to the same cultural period.

The Institution will make a thorough investigation of one or more examples of

each important type of building found in the city. The scientists hope to be able to describe the domestic economy and way of life of the Maya people following the completion of the archaeological work.

Saving New Babies

Findings made with X-ray motion pictures before and after birth are giving doctors new knowledge for saving babies threatened by death immediately after birth.

The findings were made by Dr. S. R. M. Reynolds of the Carnegie Institution of Washington's department of embryology, Baltimore, and, at Dr. Reynolds' instigation, by Drs. G. M. Ardran, G. S. Dawes, M. M. L. Prichard and D. G. Wyatt of Oxford University and the Nuffield Institute of Medical Research in England.

The X-ray movies showed, contrary to expectation, that before breathing begins there is virtually no circulation of blood through the lungs of the unborn infant. The movies were made of unborn lambs, but the findings apparently hold true for unborn human babies also.

For the first time, in the Carnegie and Oxford research, blood pressure was measured in two major arteries, the pulmonary trunk and aorta, in the unborn infant, and at each end of the ductus arteriosus. This ductus is the channel from the lung artery to the aorta, main artery from the heart. It normally closes at birth and when it fails to do so, the "blue baby" condition results.

Before birth, blood flows through this channel under considerable pressure, the scientists discovered. When the infant begins to breathe, the blood is immediately diverted from the channel into the lung arteries. As the lungs expand, the volume rate of flow through them increases almost five-fold.

At this time, the pressure in the main artery to the lungs drops to a low point. During the first few minutes after this change, the general blood pressure also falls, apparently because of the transfer to the lungs of a significant portion of the total blood of the infant.

This short, temporary general fall of blood pressure at the start of breathing in the new baby has not previously been known. If overly large, it may be dangerous. Discovery of this whole situation in the baby's circulation has already helped doctors save newborn babies.

The changes of pressure and blood flow, it was also found, have a bearing on the closing of the ductus arteriosus and, therefore, on prevention or development of the "blue baby" condition. Blood is diverted into the lungs because of lowered resistance to blood flow in them. This diversion of blood and the accompanying fall in blood pressure in the ductus apparently allow the channel to constrict and shorten through action of the elastic fibers and smooth muscle cells in its walls. Thus it is obliterated and the "blue baby" condition avoided.

Make Earth's Rocks

Progress in learning how the rocks of the earth were formed has continued in the geophysical laboratory, the annual report revealed. Many minerals have been duplicated in high-pressure furnaces, proving the conditions under which they must have formed in the earth.

Granite, which contains five of the six most common kinds of minerals in the earth's crust, has been proved to have cooled from a magma of melted rock-making material. Studies on many types of such material show that granite is the first product to form from such a magma. It will crystallize out of an alkaline liquid containing a high percentage of soda and potash.

Water can be injected into the experimental furnace in which these synthetic minerals are made, by an improvement which the scientists have added. With this equipment, it has been found that water in the form of a gas can, under the pressures found far down in the earth's crust, dissolve up to 33% silica, the main rock-forming element.

Such studies are deciding the old question of how the rocks were formed in favor of cooling conditions from hot, volcanic-like melts, instead of a reworking of older sediments.

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MEDICINE

Anti-Germ Mechanism In Mid-Digestive Tract

► EXISTENCE OF an antibacterial mechanism in the middle part of man's digestive tract, or small intestine, is reported by Miss Judith Cregan and Drs. E. S. Dunlop and Nancy J. Hayward of the University of Melbourne, Australia, and the Royal Melbourne Hospital in the *British Medical Journal* (Dec. 5).

This anti-germ, or antibacteria, mechanism is independent of the germicidal barrier of the stomach, they found from studies on 22 patients undergoing stomach operations.

Failure of scientists in the past to recognize that there are two such independent mechanisms, and that the stomach mechanism may be defective but the small intestine one intact, has led to much misconception, the Australian scientists point out.

For example, it has been suggested that vitamin B deficiencies arise in patients who have had their stomachs removed, and in those with sprue, pernicious anemia and pellagra, because bacteria that get by the missing or defective stomach barrier in such patients invade the small intestine and deprive the patient of vitamins.

This theory, the Australians point out, has no sound foundation unless or until it can be shown that the small intestine germ barrier is also defective in such patients.

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GENERAL SCIENCE

Top 1953 Science Stories

► THE TOP important advances in science and technology during 1953 as picked by Watson Davis, director of SCIENCE SERVICE, are:

1. Suggested formula for essential chemical (DNA) in living cell that allows duplication of hereditary characteristics, a major chemical and biological mystery.
2. Development of a vaccine against all three types of polio and plans for mass use in 1954.
3. Isolation and identification of polio virus, shown by electron microscope to be a sphere-shaped particle a millionth of an inch in diameter.
4. First synthesis of a pituitary gland hormone, oxytocin.
5. Successful climbing of Mt. Everest.
6. Discovery of bones of most ancient true

CONSERVATION

Biologist Saves Valley

► THE ACHIEVEMENT of a Venezuelan biologist who used his scientific knowledge and persuasive diplomacy to save a valley has won the acclaim of soil conservationists throughout the hemisphere.

Prof. Francisco Tamayo was asked by the Venezuelan government in 1946 to attempt the reclamation of the Valley of Tacagua, a barren waste of rock and sand at that time. The transformation of the valley has been so complete that visitors who have not seen it since 1946 can hardly believe it.

In the United States, Dr. Hugh Bennett, one of the founders of soil conservation, commented that Prof. Tamayo "accomplished the impossible" in reclaiming the valley. Recently Prof. Tamayo was awarded a \$2,000 prize by the Pan American Union.

The mountains surrounding the valley were once lush with vegetation, but goats raised by farmers killed off the soil-holding growth and erosion quickly ruined the valley.

When Prof. Tamayo started his work in 1947, he was faced with a scientific and diplomatic problem. First he had to persuade the farmers to sell or pen their goats, and then he had to start a planting program which would restore the growth.

A part of the human population of the valley was resettled, selected native crops were introduced so that the remaining farmers would have a source of income, and in five years approximately 30,000 sheep and goats left the valley.

Soil erosion as a result of the feeding habits of goats and sheep is a problem wherever there are mountains in Latin America. The poor people keep the goats for milk and believe that the more goats a person has the better off he is. The result is often a devastation of natural land resources.

man in South Africa and finding that Piltdown Man jaw was a hoax.

7. Successful tape recording of television programs in color as well as black and white.

8. Model testing of a new airplane wing resembling Venetian blinds that allows transport planes to take off vertically.

9. Numerical weather prediction by means of high-speed electronic computers, with the first prediction of development of an extra-tropical cyclonic storm.

10. Evidence of the greater extent and complexity of the astronomical universe, as shown both by a doubling of astronomical radio wave sources and by the realization that the visible universe is twice as big, linearly, and twice as old as supposed.

Science News Letter, December 19, 1953

• RADIO

Saturday, Dec. 26, 1953, 3:15-3:30 p.m., EST
"Adventures in Science" with Watson Davis, director of SCIENCE SERVICE, over the CBS Radio Network. Check your local CBS station.

Watson Davis will list the outstanding science events of the year and discuss the highlights of technological and scientific progress.

TECHNOLOGY

Rudderless Tugboat Puts on Good Show

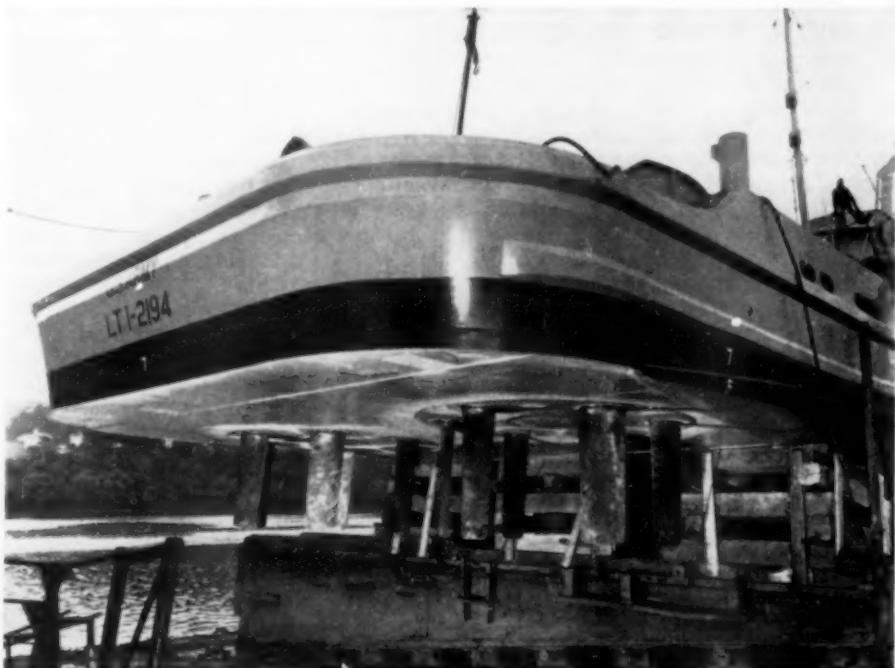
► A RUDDERLESS Army tugboat, despite its apparent physical handicap, can get where it is going.

"Sinusoidal vertical-axis propellers" replace usual screw-type propellers on the 150-foot Transportation Corps craft. No rudder is needed with this type of propeller since it can generate thrust in any direction.

The propellers consist of large horizontal rotating disks upon which plate-like paddles are fixed. The pitch of the paddles is controlled by steering wheels to produce thrust in the desired direction. The paddles, or blades, fit into two 11-foot diameter rotors that revolve as the blades oscillate. Blades in this type of propeller can be changed without drydocking the boat.

The tug has a beam of 32 feet and a normal draft of seven feet. It operates non-stop for 1,200 miles—going upstream for 600 miles against a five-mile-an-hour current, then returning 600 miles downstream.

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VERTICAL AXIS PROPELLERS—"Business ends" of the vertical axis propellers on the rudderless tugboat are these blades, each four and a half feet long, that project downward from the stern.

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GENERAL SCIENCE

1953 Science Review

New knowledge of living chemicals is probable as history's remembrance for 1953. Polio virus isolated and identified, and vaccine ready for mass trial.

This summary of the year's happenings in the world of science is limited by space to just the highlights. Most of the events are described in detail in the pages of SCIENCE NEWS LETTER for the current year. If you wish to refer to any particular report, you may find it readily through the index. (See SNL, June 27, and also the issue which will appear next week, Dec. 26.)

See Front Cover

By SCIENCE SERVICE STAFF

► TO HISTORY the most important happenings in 1953 may be rather tentative suggestions as to how life is carried on.

The Russian H-bomb, the end of the Korean war, actions of a new administration in Washington, and a dozen other events made headlines. But quiet work of scientists on the innermost structure of living material could very well rank with the great scientific discoveries of all time.

The structure and operation of living matter, particularly the protein and the other complex chemicals in the living cell, have been great biological and chemical mysteries.

Protein has a rope-like twisted molecular structure which Dr. Linus Pauling of the California Institute of Technology has puzzled out mathematically. X-ray diffraction studies have shown such patterns. For deoxyribonucleic acid, important especially in reproducing cells, two Cambridge University scientists, Drs. J. D. Watson and F. H. C. Crick, suggested a helical form that provides a mechanism for such molecules to reproduce themselves, essential to the workings of heredity.

From such fundamental research may come disease conquests of the future, since the largely unconquered viruses must reproduce similarly to larger organisms, despite their small size. Knowing what they do is a first step toward stopping them.

During 1953, the polio virus was isolated, identified and shown to be a minute sphere-shaped particle. And the work on a vaccine for polio came to sufficient fruition to allow planning of protection during 1954 of about a million school children with an immunization against polio's three types.

Oxytocin from the pituitary gland was synthesized, first of the hormones from this gland to be synthesized. This gland's growth hormone was linked to both arthritis and tooth growth, among the many findings about hormones.

A furor of discussion followed the publication of the Kinsey report on sexual behavior in the human female.

A Soviet explosion of thermonuclear or

fusion type indicated that Russia has or can have H-bombs of superpower comparable to our own. This quickened atomic energy defense activity. There was also political discussion on atomic power and work progressed on actual power plants for submarines and potential commercial use.

The 50th anniversary of aviation, dating from the Wright Brothers' first flight, was celebrated. Research began upon a new type of plane that takes off vertically through use of Venetian-blind type wing. A sort of flying landing field for fighter planes was made practical through use of a long-range bomber that launches, and then recovers in flight, the little fighter. The first plane that cracks the supersonic barrier in level flight as standard operating procedure, the F-100 Super Sabre, went into production. Planes of the future will carry a crash locator that consists of a radio beacon that goes into automatic action when disaster comes, marking the spot for rescue.

Television of the future, both color and black-and-white, will be recorded on magnetic tape in a manner similar to the tape recording of so many radio programs. This development of the year will make TV cost less in time and money than film now used.

Mechanized production of electronic devices for war and peace, through standardized unit parts made with printed circuits assembled by machine, was forecast for wide use by the Bureau of Standards' "Tinkertoy" project unwrapped during 1953. It will be used on radars, electronic bombsights and other defense equipment, and then on radio, TV and other commercial electronic devices.

Development of automatic machines, including the so-called electronic "brains," or computers, continued with promising changes foreseen for many fields. Progress was made toward application of the computers to practical weather forecasting. Development of transistors continued.

The idea that human origin occurred in Africa was strengthened by more studies and more anthropological finds. The exposure of Piltdown Man jaw as a fraud fashioned from an ape explained some discrepancies in the course of human ancestry.

With regard to present-day human beings, there was increased understanding of how we see, since the chemical progress involved in night vision was duplicated in the laboratory. In the difficult task of measuring and evaluating human temperament with objectivity, new and promising tests were developed.

The climbing of Mt. Everest left a few still unscaled mountains on the earth's surface. Beyond our sphere, there was further evidence for doubling our astronomical yardstick, making the universe both twice as large and twice as old as believed two years ago.

Realization that more knowledge of outer space is practical for radio and climatic studies, as well as for intellectual and philosophical value, spurred plans for new observatories, including a new joint one in the United States.

In a new political climate in Washington, governmental research, particularly at the National Bureau of Standards, was hampered by the "Astin affair" sparked by the battery additive controversy, despite the sustaining of the Bureau of Standards by two exhaustive reports. Other government research activities, such as soil conservation, fish and wild life protection, reclamation and weather suffered actual, or threatened curtailments. The National Science Foundation, however, received somewhat more financial support and continued to expand its program in support of research.

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AERONAUTICS

New Plane Promises Vertical Take-Offs

Work progressed on an automatic radio transmitter beacon that goes into action when a plane crashes; combined with automatic ground-based direction-finding stations, the beacon will serve to pinpoint the scene of future airplane crashes, permitting rescues in record time.

A plastic-treated material of glass fibers was found to be successful for airplane construction, saving on construction cost, permitting faster flight and making airplanes "invisible" to radar.

Tests were successful on models of a new type of airplane wing, resembling Venetian blinds, which will enable a fast transport plane to make a vertical take-off from a small airport.

A giant long-range bomber was adapted to make it possible for a full-size combat jet plane to act as a parasite plane on it, landing on, as well as taking off from, the mother plane.

A rotary bomb bay door solved the problem of dropping bombs from very fast planes flying through flak-filled skies.

The Sea Dart, the Navy's revolutionary delta-winged jet fighter that can land and take off in water, entered final experimental tests at the year's end.

A prototype of the F-100 Super Sabre, now in production for the Air Force, attained supersonic speed in performance; it set a new official record of 754.98 miles an hour.

A new altitude record was set at 83,235 feet in an experimental plane.

The experimental Douglas D-558-II Skyrocket set a new unofficial speed record of 1,327 miles an hour by flying twice the speed of sound (Mach 2).

Air Force got what is believed to be the world's largest helicopter, carrying 40 passengers and three crewmen. It is shown on the cover of this week's SCIENCE NEWS LETTER.

A swept-winged guided missile, capable of striking at supersonic speeds from submarines, surface ships and shore bases, was developed.

Tests showed that lack of gravity will not harm the body or mind of the space traveler.

Gadgets were developed for guided missiles to correct automatically for navigation errors due to faulty construction, winds, changes in air density and other factors that might throw the missile off course.

Two Navy guns were paired into a team automatically loaded, controlled electronically by the ship's radar and fire control system, and capable of spitting heavy flak at guided missiles.

In-flight refueling became a practical reality.

A new synthetic lubricant for jet engines was developed to enable designers to create fighter planes that can fly higher and faster and operate in Arctic as well as tropics.

Synthetic lubricants from pine gum were found useful in the extreme cold of the Arctic.

Zirconium dioxide powder was stabilized to withstand the extreme heat of jet engines and rockets.

An electronic "brain" was invented that will calculate the arrival time of airplanes at an airport and, in case two planes would arrive simultaneously, figure out a slight detour for one.

A robot pilot was developed to control the flight of a heavy plane from take-off to landing, using flight data coded on a punched paper tape.

A new kind of radar, which responds to airplanes but not to stationary objects such as buildings, went into operation as a landing aid.

A sled that can travel at twice the speed of sound was created to test the design of new parachutes for jet planes.

ANTHROPOLOGY-ARCHAEOLOGY

Find Bone Fragment Of Most Ancient Man

A fragment of bone of the most ancient true man so far known, some millions of years old and found in South Africa, was cleaned and readied for scientific study.

Fresh evidence that the "Taungs Baby" was more human than ape was provided by a mathematical study of the dimensions of the milk canine teeth.

A complete rib of 12,000-year-old Folsom Man, with the skeletons of three dire wolves that had probably killed him, was found in New Mexico.

Bones of the Old Stone Age infant were found in a cave in Iraq; the cave is now inhabited and has been continuously for some 100,000 years.

Human weapons and tools found in the frozen soil of Alaska were dated by geological methods as being from 3,000 to 7,000 years old, belonging to a period when the climate was much milder than it is today.

Further evidence of a pole-girdling migration of early man from Europe through Siberia, Alaska and Canada to Greenland was seen in delicately made burins found near the west coast of Hudson Bay.

The jaw of Piltdown Man, the "Dawn Man" of Sussex, was definitely proved to be a hoax; the other skull fragments are authentic but not more than 50,000 years old.

Fluted weapon points of the type known as eastern Folsom, relics of people who lived some 7,000 years ago, were found near the Roanoke River in southern Virginia.

Evidence in the form of associated extinct animal bones showing that the ancient men who were makers of the "Clovis" points were hunting in America more than 15,000 years ago was reported; similar evidence showed that Folsom Man, although more recent than the Clovis people, lived in America long before Yuma Man.

The first known Indian-carved nude figure of a woman found on the face of a canyon wall showed the marks of smallpox eruption and commemorated the recovery of the woman.

The practically unknown people of the upper Xingu River, in Brazil's Mato Grosso, were

visited by a party of anthropologists and found to be dying out.

Technical experts recommended the new use of 2,000-year-old cisterns to store water to reclaim the Negev desert area in Israel.

A cooperative X-ray study by medical and anthropological experts of Indian bones in the Smithsonian Institution was undertaken; it is expected to show whether tuberculosis and syphilis are native in America.

An intensive study of children on Manus Island 25 years ago was followed up by study of the same individuals as adults.

ASTRONOMY

New Observatories and New Equipment in 1953

Plans for establishing a national observatory to be run jointly by several institutions were discussed.

Construction was started on the world's largest telescope for radio observation, the 3,000-inch at Jodrell Bank near Manchester, England.

A new method of combining photography and electronics was used to obtain clearer and faster pictures of faint stars.

An ultrasensitive, photon-counting photometer doubled the volume of space viewed by Mount Palomar's 200-inch telescope, allowing observation of magnitude 23 stars.

Radio waves emitted by neutral hydrogen were used to discern that the volumes of the Clouds of Magellan are larger and their motions more turbulent than when measured by light alone.

Further evidences that the universe is more than twice as large and twice as old as previously estimated, and is expanding at a much slower rate, were reported.

Confirmation of the belief that most asteroids are irregular rotating fragments was obtained from photoelectric measurements of ten asteroids.

Theories for applying Einstein relativity equations to gas dynamics were developed.

The Lyman-alpha spectroscopic line of hydrogen, far in the ultraviolet portion of the sun's spectrum, was successfully photographed for the first time from a rocket nearly 50 miles above the earth's surface.

Occultation of the radio source in Crab Nebula by the extreme outer parts of the sun's corona was observed for the second time.

Galaxies in collision and ghosts of dead stars were suggested as sources of heavenly radio signals; the number of known radio sources was doubled.

Radio astronomers hope to find out how fast the universe is expanding by measuring, in the radio range, "red shifts" of very far distant galaxies.

Further observations of sections of the spiral arms of our galaxy in the Milky Way were made, sodium and calcium as well as hydrogen serving as signposts.

The Large Cloud of Magellan, nearest galaxy, was found to contain scores of supergiant blue stars 10,000 times as bright as our sun and colossal red stars as much as 1,000,000 times the sun's volume, the red stars probably being the youngest stars in that galaxy.

Trails of ionized air left by tiny meteors entering our atmosphere were found to reflect radio waves, promising to double or triple the channels available for communication over thousand-mile distances.

Support for the theory that comets have hearts of ices of common gases was obtained from discovery of very hydrogen in spectrographs of Perseid meteors.

The first sunspot of the new solar cycle was seen.

Part of the light of the night sky was ac-

counted for as produced when powerful cosmic rays enter the upper atmosphere.

Data on observations of zodiacal light supported the theory that this light is sunlight reflected by the scattered remains of the cosmic dust cloud from which the solar system may have been formed; the connection of the zodiacal light and the corona was demonstrated.

A new type of camera was developed to obtain clear photographs of the moon and background stars on the same plate.

Glycine and two other amino acids, necessary for living things, were produced in a miniature atmosphere of methane, ammonia, water and hydrogen by an electric discharge.

A machine for automatically scanning photographic plates, identifying and measuring the exact location of stars, and recording their positions, was put in operation.

An asteroid, moving very rapidly and approaching close to the earth, was observed.

Five eclipses, three partial eclipses of the sun and two total lunar eclipses, occurred during 1953.

Two more meteor streams were linked with periodic comets, Comet Tuttle 1926-IV and Comet Mellish 1917-I.

A transit of Mercury, a rare astronomical event occurring only 13 or 14 times a century, was observed on Nov. 14.

BIOLOGICAL SCIENCES

Heredity Units Tied To Chemical, DNA

The manner of duplication of chemicals that carry on heredity within the germ cells was suggested by the proposed structure for deoxyribonucleic acid (DNA) as two intertwined complementary molecular chains which uncoil and become templates for genetic replication.

An answer to the key question of photosynthesis was proposed in a theory that energy packets released by chlorophyll strike the protogen molecule, breaking a bond tying the two sulfur atoms together; the energy is retained in the two resulting molecular fragments that then combine with other molecules to build protein.

Tests duplicating conditions that probably existed before life appeared on earth showed that chlorophyll could have been spontaneously created when two common gases and water were passed over heated silica.

Chlorophyll was found to promote the release of water vapor from leaves, in addition to its function in capturing energy from sunlight, in the manufacture of food out of carbon dioxide and water.

Debris of chromosomes left after the smashing of a virus have been photographed with the electron microscope.

Algae can provide food high in protein and other necessary food elements suitable for human diet; it was found, giving promise of saving future populations from starvation.

By labeling two bacterial viruses with radioactive phosphorus, it was found that the virus attacks its cell victim through chemical groups of atoms on the cell's surface.

Ways were found to increase the growth of algae in sunlight so as to provide a possible oxygen source for future space travelers.

A combination operation of sewage disposal and algae growing produced fodder for higher animals during waste disposal.

Chick embryos survived freezing in liquid nitrogen at 320 degrees below zero Fahrenheit and thawing in tyrode solution.

A new method was found for keeping cells alive inside a plastic incubator under a microscope while motion pictures were made.

A coelacanth, survivor of a long-gone geologic

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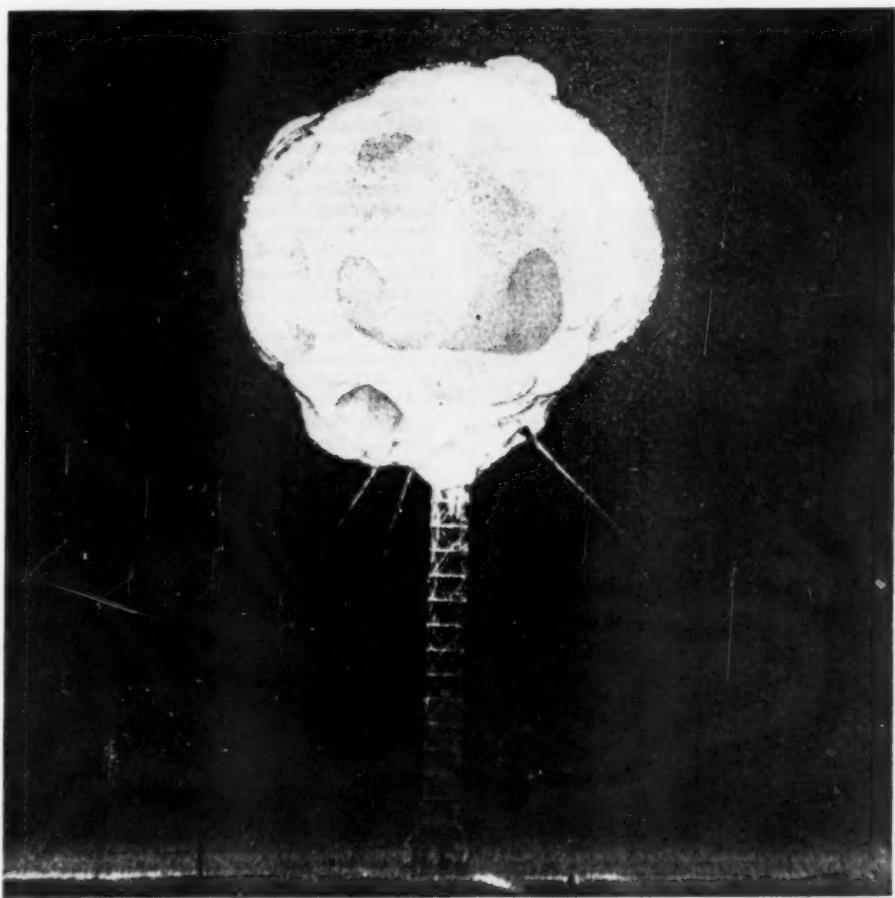
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FROZEN EXPLOSIONS—This fiery ball from what the Atomic Energy Commission reservedly calls the explosion of a "nuclear device" on March 17 of this year was stopped photographically in a few millionths of a second by a super-speed camera just before it disintegrated the steel tower shown below it. The camera, called the Rapatronic, has an electronic shutter and no moving parts. A single exposure type, it was built by Edgerton, Germeshausen & Grier, Inc., of Boston.

age, and the third ever found, was caught off Madagascar.

Bacteriological warfare experts joined forces with biologists to isolate the poison with which "red tides" kill fish.

A mystery disease of young cattle, usually fatal, attacked animals in western corn belt states, and was studied in about 50 herds.

A strange disease that attacked sheep flocks in California was identified as blue tongue sickness, previously unknown outside of Africa.

The San Benedicto Island wren was rendered extinct by the birth of a new volcano on the island.

New birds, including babbler, lark and warbler, were discovered in the Arabian Sultanate of Muscat and Oman.

Genes are changed by mutation-causing agents but only indirectly through changes in the cell metabolism, it was found.

Better varieties of many vegetables and flowers became possible through development of a sterile pollen method of producing hybrid seed.

Brood X, biggest and widest-spread group of the periodical 17-year cicadas, emerged for six weeks of life spent in singing and laying eggs that will hatch in 1970.

Tiny black beetles of the family *Nitidulidae* were found to spread the fungus disease oak wilt from infected to healthy trees.

Gypsy moth caterpillars set a new record for tree damage when they destroyed the foliage of some 1,500,000 acres of trees in the New England region.

After the destruction of large numbers of animals with the "sanitary rifle," Mexico abandoned the attempt to wipe out hoof and mouth disease in this way, but later agreed to the "evacuation" of diseased animals.

A new antibiotic, oligomycin, was isolated and showed promise in the control of plant fungus diseases.

A hydrocarbon insecticide 100 times as deadly as DDT, yet non-poisonous to man and domestic animals, was developed.

Study was begun on the long-neglected horseshoe crab, sea creature that has resisted evolutionary change for millions of years.

Sharp decreases were noted in the catch of two California commercial fish species—sardines and Pacific mackerel.

Psittacosis, parrot fever, was found for the first time in turkeys.

New rules were adopted to govern the scientific naming of animals; it is hoped that they will end the confusion between European and American practices.

Australia's marsupials have been getting smaller since the Pleistocene age and the process is still going on, it was found.

CHEMISTRY-PHYSICS

Einstein Revises Gravitational Theory

A revision of Einstein's generalized theory of gravitation was published, a forward step toward finding a single theory to describe both gravitation and electromagnetism.

Experimental proof was obtained for the Nernst-Einstein relation of the mobility of electrons and holes, important in transistor research.

The spinor was suggested as the first arch of a possible bridge between Einstein's unified field theory and quantum concepts.

A thermometer sensitive to the electrical noise generated by heat in a fine platinum wire was investigated for measuring high temperatures.

The radio roof, or reflecting layer, was found to lower to the usual daytime level just as the sun begins to rise.

Hard-to-detect strains in metals were spotted by measuring minute changes in spacing between their atoms as revealed by X-ray diffraction.

Prediction was made of a new acousto-electric effect by which electrons are carried by sound when an acoustic wave passes through a semiconductor.

The exact time that an electric charge hovers over one or another of the atoms in a molecule was calculated.

New information about the meson was promised by the discovery that this fundamental particle can originate in atomic collisions of only a few billion electron volt energies.

Beams of mesons were used to measure the size of the atomic nucleus, which was found to be smaller by 15% than previously thought; a polarized proton beam was also used to study the nucleus.

More accurate evidence was obtained that atomic nuclei can be electrically excited without actually colliding.

A 60,000-kilowatt full-scale atomic reactor was designed to produce peaceful atomic energy.

A cosmic ray observatory, serviced by airplane, was established on the summit of Mt. Wrangell, a 14,000-foot peak in Alaska.

Bombardment of the earth with cosmic rays from outer space has not varied more than 20% over the last 35,000 years, it was concluded.

A new charge exchange accelerator using protons as atomic projectiles, under development at the University of California, was dubbed the "swindleton" because it "cheats" by giving two boosts of energy to the projectile for each electrical impulse.

Plans were discussed for a 15-billion-electron-volt "colossatron," a giant atomic accelerator using the new, strong-focusing principle developed last year.

The beam of a 2,000,000-volt atom smasher was pin-pointed so that it would strike only one or a very few of the genes in a living cell, contributing information on which parts of the cell would be most affected by radiation from an atom bomb.

An electron synchrotron that may later use the new strong focusing system started work at Cornell University.

The Patent Office allowed claims on a high-frequency analysis aid that gives a highly sensitive reading of molecular changes when a known chemical is added to an unknown solution.

The possibility that the hydrogen bomb can be made without using the older fission-type atomic bomb as a trigger was speculated upon. A possible trigger was forecast in exploding wire experiments in the 1920's to duplicate the temperatures of the stars.

An explosion occurred in Russia which may have been of a hydrogen superbomb; civil defense authorities assumed that Russia has a stockpile of at least 67 atomic bombs.

Blast waves from an atomic bomb in Nevada rose as high as 50 miles into the sky to be reflected back to earth as much as 600 miles away.

A new joint task force was planned to continue research on "thermonuclear weapons" at Eniwetok and Bikini.

The Nobel Prize in physics was awarded to the Dutch physicist Dr. F. Zernike of the University of Groningen for development of the phase microscope, in which living cells can be "stained" by light waves without killing them.

The chemical structure of aureomycin, antibiotic drug, was discovered, making practical synthesis possible although highly improbable.

Substances known as lysine polypeptides, which affect some viruses and bacteria in much the same way as the antibodies that create immunity, were synthesized.

Catalase, an important plant and animal enzyme, may be a factor in the natural synthesis of both chlorophyll and hemoglobin, plant and animal research indicated.

ACTH, pituitary gland hormone, was isolated as a pure white powder soluble in water and with a molecular weight of about 3,500.

FAD, or flavin-adenine-dinucleotide, coenzyme essential to the utilization of oxygen, was synthesized.

An electronic device was developed, operating ultrasonically or in the audible range, to measure liquid flow, including blood flow without use of surgery.

A new way of separating small particles, such as cells or bacteria that are of equal density but different electrical conductivity, was found in their behavior in a magnetic field.

Careful temperature control made possible the manufacture of germanium crystals uniformly enough to make transistors interchangeable.

A sixth series of atomic spectrum lines, as well as the five previously known, was found in light given off by excited hydrogen atoms; the new series is in the infrared part of the spectrum.

When a cerium compound is dissolved in water and the solution set in sunlight, it was observed, two chemical reactions occurring in seesaw succession split the water into hydrogen and oxygen.

Compounds of aluminum, gallium and indium with arsenic and antimony were found capable of acting as semiconductors and possibly as replacements for hard-to-get germanium.

By separate studies of X-ray diffraction patterns and mathematical theory, new understanding was reached of the structure of protein as a complex twisted form in which spring-shaped molecular chains are intertwined.

Nine semi-living chemical substances known as enzymes were found to work in unison to permit the human digestion of fat.

A new natural uranium mineral, found in a Utah mine, was named Umohioite.

Radioactive cotton grown on a living cotton plant gave scientists new evidence on how cellulose is formed.

A whole new series of plastics was made possible from compounds of phosphorus, nitrogen, boron and arsenic with other chemicals.

A synthetic rubber with resistance to aging due to oxidation and long wearing was made from the antifreeze fluids, propylene glycol and ethylene glycol, mixed with adipic acid.

A food packaging material was made from a special type of saran that shrinks to fit the contents.

A fertilizer material was developed to give soil a full year's supply of nitrogen safely in one application.

Drying of paints, varnishes and inks was hastened by adding amine chemicals and metals to the linseed oil.

Cooking fat odor found unpleasant in res-

taurant kitchens was conquered by synthetic antioxidants that protect against rancidity.

A new chemical to protect foods from mold spoilage was announced, as were two soy products that give bread a built-in fresh feel.

The tang of the Mexican drink tequila was found to be contributed by inulin, contained in the agave plant in place of starch; this is fermented to alcohol.

The Nobel Prize in chemistry was awarded to Dr. Hermann Staudinger for pioneering research in high polymer chemistry, establishing that the molecules of polymerized materials are true compounds and have their atoms in long chains.

EARTH SCIENCES

Government Enters Numerical Forecasting

An English party succeeded in reaching the top of Mr. Everest on the eve of Queen Elizabeth's coronation; other attempts were made to climb Mt. Annapurna, Nepal (successful), Mt. Goodwin Austen (Mt. K-2) on the Pakistan-India border (unsuccessful), and Mt. Llullaillaco on the Argentine-Chilean border (successful). The greatest depth under the sea was reached when a descent was made to 10,339 feet off the island of Ponza, Italy, where complete blackness was found broken only by phosphorescent flickers.

Numerical weather prediction by means of high-speed electronic computers achieved, for the first time, prediction of the development of an extra-tropical cyclonic storm; because of this success, the government established an operational numerical forecasting unit.

Granite rock from Manitoba, Canada, was found to be 3,500 million years old, the oldest

known; lead tetramethyl, made from radioactive lead, yielded the same figure.

A hurricane's eye extends to the top of the storm and then comes back to earth in a second column of calm air 200 to 300 miles away called the "hyperbolic point"; tracking the hyperbolic point, it was reported, may permit better forecasting of the hurricane path.

Cross-polarization of radar transmitting and receiving instruments made it possible to detect the presence of ice crystals in high clouds, thus providing additional clues relating to the occurrence of rain or snow.

The process by which heat and pressure deep under the earth's crust deform rocks and cause them to flow was duplicated in the laboratory.

Great internal waves, reaching a height of 300 feet but not rippling the surface, were found in the heart of ocean depths.

The general level of the world's oceans was found to have risen five inches since 1895, due largely to melting polar ice.

A disastrous flood resulting from a severe storm caused great damage in the low countries of Europe.

Dutch farm land, ruined by salt when floods broke the dykes and rushed over the land, was reclaimed by a process of ion exchange.

A widespread and serious drought caused great loss, especially to cattlemen, in the Southwest.

A national water shortage was found to be due to greatly increased use and not to a general drop in water resources.

Volcanic eruptions included one of Krakatoa, famous East Indian volcano, and a new volcano, San Benedicto, off the Lower California coast.

Research studies indicated that the earth's core is of solid iron surrounded by the same metal in a molten state, and that the temperature at the boundary between the two is a little greater than 8,400 degrees Fahrenheit; jet streams and swirling currents make motion of the core similar to that of the upper atmosphere.

More than 500 tornadoes hit the United States, making 1953 a record year, the increase being attributed in part to improved observing and reporting programs.

The first "mid-ocean" submarine canyon was discovered.

Underwater television was successfully used to study fish life 100 feet below the surface of a Canadian lake and the ocean bottom at a similar depth.

A new radioactive mineral called cheralite, containing uranium and thorium, was discovered in India.

Motion pictures, taken of a radar screen tracking the storm, showed the birth and growth of a Midwestern tornado.

Congressional action provided for the establishment of a committee to study the feasibility of rain making and other forms of weather modification.

Holes drilled through 4,000 feet of the hard coral crust of Eniwetok atoll uncovered evidence that the base rock is volcanic lava.

Powerful flashes of lightning were found to be associated with the growth of ice pellets or soft hail of thunderstorms.

Large scale eddies, cyclones and anti-cyclones were duplicated in laboratory models of the atmosphere, using both smoke in air and dyes in water.

Preliminary studies of the formation of fog droplets indicated that the nuclei may be partly made up of tiny crystals of salt evaporated from the ocean.

Measurements of electric charges on cloud droplets and the electric field of natural clouds suggested that the reason certain clouds produce rain and others remain unproductive may be related to electrification.



TWISTED STRANDS OF LIFE —
Dr. Linus Pauling, California Institute of Technology chemist, demonstrates with strands of rope how strands of molecules are twisted into the structure of protein. Such studies may explain the nature of living matter, as scientists learn to unravel the rope-like form, and may also yield clues to cancer's cause and cure.

Theoretical relationships between the vertical ascent of air and the rate of precipitation were developed into practical forecasting procedures.

A new type balloon made of nylon webbing launched from the nose of a rocket was used to obtain weather data from extremely high altitudes.

A new seismograph capable of recording strong earthquake waves after they have circled the earth eight times went into operation and recorded mantle Rayleigh waves, extremely long waves that may penetrate to the core of the earth and reveal its structure.

Fragments of a skull unearthed in Oregon were identified as belonging to a 10,000,000-year-old mastodon.

An inexpensive, easy-to-build wind gauge was developed for the use of farmers in connection with agricultural spraying.

An optical hygrometer, new, highly sensitive, speedy instrument for measuring humidity, especially useful in below-freezing temperatures, was developed.

Study of 50-year records of the intensity of sunlight revealed information about the thickness of the ozone layer surrounding the earth.

The speed with which stars twinkle may indicate where jet streams are and how fast they flow, it was suggested.

Dammed up water in three abandoned anthracite coal mines seriously threatened the economic future and safety of three counties in Pennsylvania.

Fluctuations in the Florida Current, important branch of the Gulf Stream, were measured during 1953 by electromagnetic induction.

Oceanographers found a heat flow from the ocean bottom equal to that from high and dry continents caused by radioactive elements.

For the first time in 20 years, snow-covered glaciers in Norway slowly moved forward.

A new research tool, in the form of a bibliography of all the literature on the Arctic put out in the last 75 years, was made available.



TRANSISTOR MODELS—These are experimental models of the novel device that promises to revolutionize electronics and communication. Of extremely small size, and using infinitesimal amounts of power, the transistor is nevertheless rugged and does most of the work of fragile vacuum tubes.

A 400-kilovolt transmission line was successfully used to transmit hydroelectric power over a 600-mile distance in Sweden; this is a record high operational transmission voltage level.

Development continued on unusual ceramic materials needed by the Atomic Energy Commission to withstand the harmful effects of atomic radiation and extraordinary high temperatures.

Some half dozen catalyst beads impregnated with radioactive zirconium were used routinely to indicate the circulation rate of billions (tons) of catalyst beads in several gasoline cracking refineries.

An experimental plant went into operation to extract aluminum metal from common clay; the idea is to make this country independent of imported bauxite as an aluminum source.

A specially built camera making exposures of from one- to ten-millionths of a second was used to photograph tiny dirt and moisture particles in the air.

Nut shells and fruit pits were put to industrial uses such as anti-skid agents in car tires, fillers in plastics and blasting grits for cleaning airplane engine parts.

Silicone rubber was used successfully for electric wire insulation, standing up under extremes of heat and cold.

A "bottle-cap" bomb was developed to be exploded underwater in case of shipwreck to send a call for help through water to the Navy's underwater listening posts in the Pacific.

A miniature radar-ranging gear was developed to feed range information continuously and automatically to the gunsight in a fighter plane to relieve the pilot of this extra work.

An airborne television camera was under development to aid in battle action, and to survey disaster needs and work.

A three-dimensional technique was developed for making photomicrographs.

A combination of asphalt and white-burned flint was used to make a skidsafe highway surface.

New streamlined periscopes were put on Navy submarines.

An electric power generator with turbine was designed to be powered by steam above the "critical pressure"—the point above which water changes to steam without boiling fast.

Water was pumped into the subsoil of Mexico City by rehydration wells to restore the water supply of the city and stop its sinking into the ground.

Small gobs of air, called "dielectric" eddies, in the atmosphere were found to disrupt television transmission in fringe areas.

Television waves and other very high frequency signals were found to be bent around mountains by diffraction to continue along a long path on the other side of the obstacle.

A new film scanner was developed to improve the quality of movies broadcast by television. Coating cookie trays and other baking pans with a new plastic, polytetrafluoroethylene, made it unnecessary to grease the pans.

Storing natural gas underground near the location of heavy users was found to help alleviate gas shortages during sudden cold snaps.

An L-shaped fence staple with the long shank threaded was introduced and found to carry a heavier load and hold better in creosoted posts than the older U-shaped staple.

A wire rope with a plastic core unaffected by acids, caustics and other sub-surface substances was developed for use in drilling oil and gas wells.

Magnesium was used in lightweight automobile bodies and found to be better than plastic.

An electromagnetic "divining rod" was developed to locate underground water sources.

A new method of reproducing maps by linescribing on an opaque emulsion applied to plastic sheeting was reported.

The familiar white stripe marking the traffic lanes on highways can now be made of long-wearing plastic, it was reported.

An aerial estimator, device resembling a reflector-type gunsight, was developed to help in estimating the size of forest fires, timber stands, lakes, etc.

A fluorescent lamp with quartz inner tube was found to give about two and a half times more light than an incandescent lamp of equal wattage and to last about five times longer.

A method was found for working 16-Alfenol, heretofore an unusable magnetic curiosity.

Use of barite as an aggregate in concrete was found to help buildings withstand the blast of bombs and protect the occupants from atomic radiation.

ENGINEERING-TECHNOLOGY

Tape Recording System For Color Television

A tape recording system was developed for black and white and color television programs which permits immediate playback, can be wiped clean and reused, and costs much less than film recordings.

"Project Tinkertoy" proved satisfactory; it is a program for putting radios, radars and electronic bombsights into mechanized production through use of standardized parts of printed circuits that can be assembled by machine.

Progress toward entirely push-button factories included an electronic machine controlled by instructions on a magnetic tape, and an automatic eye operating in the infrared to give a continuous analysis of liquid chemicals.

Electronic machines to handle such clerical work as production scheduling and supply problems were under development.

A mathematical model of an electronic computer that reproduces itself was developed.

A new type of "brain" utilized 10,000 tiny ring-shaped magnets woven into a netting of wires to serve as a memory to store 10,000 bits of information in an instant.

A new automobile motor oil was developed to help engine starting in extremely cold weather, but which will not evaporate when the days turn warm.

A wrist radio using five transistors instead of vacuum tubes was produced; it picked up broadcasts 40 miles away.

A coaxial telephone cable system was installed between New York and Philadelphia to carry simultaneously 1,800 separate conversations.

An amphibious cargo vehicle, looking like a cow and intended to land tanks ready for combat, was reported.

A new insecticide that will enable the housewife to mothproof her woolens in the rinse water was reported.

Use of radioactive tracers to label the oil intended for various destinations enabled the operator at any point along the pipe-line to draw off just the batch intended for him.

Two new types of transistors, "tetrodes" and "pentodes," were announced; they have three and four wires, respectively, instead of two.

Crystals of barium titanate were found capable of "memorizing" answers to 250 questions and producing them on demand in the form of positive or negative electric charges.

A large experimental transistor has been produced that is capable of handling 20 watts of output power.

Work began on a new television technique that permits engineers to substitute inexpensive postcard-like pictures for elaborate stage sets.

A telephonic robot device was developed that "listens" to clearly enunciated digits, then matches the sound pattern electronically to standard referents stored in its memory, and responds by flashing an appropriate light.

Three-dimension (3-D) rocked the movie industry as Natural Vision, using polarized light and glasses, competed for box-office dollars with CinemaScope, using anamorphic camera and projection lenses.

Mathematical formulas were worked out with which engineers can determine when the electric devices used in airplanes and guided missiles are likely to break down.

MEDICAL SCIENCES

Polio Virus Shown As Sphere-Shaped

Plans for a large scale field trial, starting in February, 1954, and involving at least 500,000 second grade children, of a vaccine against all three types of poliomyelitis were announced.

Gamma globulin from blood was given widely to children in many regions in hope of preventing paralysis from poliomyelitis, following reported successful field trials of it in the 1952 season.

Electron microscope pictures and measurements of the poliomyelitis virus were made, showing it to be sphere-shaped and about a millionth of an inch in diameter.

Discoveries of a new virus, called Mack virus, which can cause a polio-like disease, and of another virus, called Kentucky virus, which may be a fourth type of polio virus, were announced.

The third of the three known strains of polio virus was adapted to growth in laboratory mice.

Synthesis of oxytocin, first pituitary gland hormone to be synthesized, was announced with the hint that synthesis of another pituitary hormone, vasopressin, was almost accomplished.

Growth hormone from the pituitary gland and thyroxin from the thyroid were reported responsible for tooth growth and eruption.

Essential fatty acids from fat in the diet were reported effective in protecting laboratory rats from critical doses of X-rays similar to atomic bomb radiation.

Three women became pregnant by artificial insemination with frozen human spermatozoa in first application to humans of method widely used in animal breeding.

First report of study of first generation of children born to parents who survived atomic

bombing in Hiroshima and Nagasaki showed no bad effects of significance, with only slight increase in stillbirths and births of malformed babies.

Siamese twins joined at the head were separated surgically with survival of one.

Study of sexual behavior of 5,940 white women showed, among other things and for the group studied, although there were wide individual variations, that females become sexually responsive later and remain so to an older age than men, are affected by fewer and different psychological factors than men, are more faithful when married than men, are more successful in marriage when prepared by premarital sexual experience and are less "frigid" in marriage if born after 1900 than before.

Research suggested patients with multiple sclerosis might be helped by a diet low in fat, particularly if started early in the course of the disease.

Treatment to raise blood pressure and stimulate circulation was advised for multiple sclerosis patients in a report showing two-thirds of all early, microscopically small multiple sclerosis damage spots located close to blood vessels, and that more than half of 250 patients had markedly low blood pressure.

More people have multiple sclerosis and there are more deaths from the disease in Canada and the northern states than in the South, a geographic survey showed.

A chick embryo method for cutting time to diagnose tuberculosis from weeks to days was announced.

A new drug promising to help streptomycin in treatment of tuberculosis, called HES, or hydroxyethyl sulfone, was synthesized.

An anti-tuberculosis vaccine was made from urea-killed virulent human tubercle bacilli.

A chemical in the body, lysozyme, was found important in resistance to tuberculosis.

A way to avoid sleeping-pill deaths was found by combining a barbiturate with Metrazol.

Evidence was found that the growth hormone from the pituitary gland may be the cause of arthritis.

Cortisone, anti-arthritis adrenal gland hormone, was reported effective antidote for yellow phosphorus poisoning.

One form of anti-anemia vitamin B-12, hydroxy-cobalamin, was found in mice to act as swift antidote to cyanide poisoning.

Formation of disease-fighting antibodies was found to depend, in part at least, on getting in the diet plenty of these vitamins: pantothenic acid, folic acid and pyridoxine.

Examination of white blood cells for lymphocytes with two-lobed nuclei was reported a practical, sensitive test for exposure to very small amounts of atomic radiation from cyclotrons.

The hereditary bleeding disease, hemophilia, heretofore thought only a male disease, was found to occur in females also.

The artery disease, atherosclerosis, was produced for the first time in monkeys by a special diet, giving scientists an animal that eats human type food for further research on this circulatory disease.

Novocaine was announced as a simple cure for warts on the soles of the feet.

Cortisone was reported to have saved 75% of babies from Rh blood deaths.

Radioactive cortisone and hydrocortisone were made with carbon 14.

Discovery of a link between anti-anemia vitamin B-12 and diabetes, particularly diabetic blindness, gave further evidence for the vitamin being involved in the body's handling of fat and carbohydrates.

Plasminogen, newly isolated fraction of human blood, was found capable of dissolving dangerous blood clots in veins.

A blood pressure lowering chemical, andromedotoxin, was discovered in rhododendron leaves.

A parasite called toxoplasma was announced as probable cause of widespread eye infections.

Irradiation of pork with cobalt 60 was reported effective for killing trichinæ, a serious disease, trichinosis.

A treatment with 22 amino acids and selected vitamins was reported helpful in muscular dystrophy.

Discovery that there are groups and types of blood platelets as well as of red blood cells was announced.

Discovery of the tissue network that connects teeth to gums was announced.

Adrenalin production starts before birth, perhaps helping prevent prebirth or birth asphyxiation, studies of unborn lambs showed.

A new drug for ulcer patients, a quaternary ammonium compound akin to so-called soapless soaps, went on the market.

Methoxamine hydrochloride, a synthetic drug, was found effective for treating excessively rapid heart beating (supraventricular tachycardia).

Discovery of an abnormal adrenal hormone, 17a-hydroxypregnanolone, in arthritis patients was announced.

A new adrenal gland stimulating hormone from the pituitary, called AGF and distinct from ACTH, was discovered.

Rheumatoid arthritis was labeled a killer as well as a crippler for the first time.

A drug to eliminate excess water, sodium and potassium from water-logged tissues of patients with congestive heart failure was made from sulfanilamide, trade named Diamox.

An artery crushing operation was found to relieve rigidity and involuntary movements of Parkinsonism.

The digestive enzyme, trypsin, was found capable of dissolving life-threatening clots in the heart's arteries and, in aerosol form, of helping asthma patients.

A synthetic drug that stops coughing without addiction or pain-relieving properties was found in the dextro isomer of the synthetic pain-killer, Dromoran.

A case of so-called sex reversal, more accurately castration and hormone treatment to enable a male transvestite to achieve more nearly the desired feminine state, was widely reported and discussed.

Temporary relief of symptoms in an always fatal type of brain cancer was achieved by neutron radiation treatment.

A drug, 6-mercaptopurine, that halts leukemia at least temporarily was announced.

A new synthetic hormone drug, androstanolone, with weak masculinizing effects, was reported helpful to women with advanced inoperable breast cancer.

Radioactive gold wire encased in non-active gold tubing was developed as a safer and more advantageous treatment for cancer than the use of radium seeds.

Plans for treating cancer patients with radiation from cesium 137 were announced.

A fatty substance from small intestines of mice and rats was found to destroy cancer cells in the test tube, leaving normal cells unharmed and seen as clue to chemical control of cancer.

Hormone production of the mother's glands during pregnancy was reported possibly causing predisposition to some kinds of cancers.

Diagnosis of heart disease by TV was promised for the future through a new X-ray unit.

Three-dimensional X-ray pictures were made using synchronously moving X-ray tube and subject.

An electric stimulus across the chest was made to act as sole "pacemaker" to keep a

stopped heart beating for five days when it started on its own again.

The heart was found to beat faster, pumping more blood to lungs and tissues, at high altitude.

The \$60,000,000, 500-bed clinical center of the Public Health Service opened.

The 1953 Nobel Prize in medicine was awarded jointly to Dr. Fritz A. Lipmann, Harvard, and Dr. Hans Adolf Krebs, Sheffield, England.

PSYCHIATRY-PSYCHOLOGY

Research Team Measures Combat's Effects at Front

For the first time, a research team went into the combat area and obtained measures of the physical and mental consequences of combat stress; important effects were found to be dehydration and a serious reduction in adult white blood cells.

The chemical process involved in night vision was duplicated in the laboratory and one of the chemicals involved for daylight vision, cyanopsin, was produced from an extract of dark-adapted rods and the cones from chicken eye retinas.

Several objective tests were found to be promising for the measurement of temperament, including a color film to test for the dominance of form over color perception or the reverse.

When an image is kept in exactly the same place on the eye's retina, it soon vanishes; when natural eye movements cause the image to shift, fine lines tend to fade but reappear, although heavy lines remain steady.

New experiments showed clearly that complete darkness is best for dark adaptation, but that red goggles now used in the armed services do well enough for practical purposes.

Individuals can learn to recognize at least 10,000 distinct odors and can detect specifically tenuous odors, it was found, but they are quite poor at distinguishing slight differences in intensity of smells.

Two kinds of pain, pricking and burning, follow the same nerve pathways to the brain, it was determined; a finding important to surgeons performing nerve-blocking operations to relieve intractable pain.

Recorded messages such as telephone weather predictions were speeded up in transmission as much as two and a half times without loss of intelligibility by a system of cutting and splicing the recording tape.

The part of the brain that controls appetite was located in the hypothalamus at the base of the brain.

Individuals with high scores on intelligence tests do even better as they grow older, retesting after an interval of 30 years indicated.

Little boys should be six months older when they start school than are little girls, tests of maturity on children indicated; this would save about two per cent on the cost of education.

Follow-up study of individuals, who as children were placed in "opportunity rooms" for mental deficiency, showed they make a much better adjustment to life than has been supposed and their children, if any, go through school with little or no retardation.

An Institute of Human Variation was established to study what biological and social factors are responsible for producing differences between individuals.

Few people act strictly according to their own prejudices, and many people live in a remarkably strict self-imposed segregation from other groups; these were preliminary findings of an eight-year study of intergroup relations.

Production increases by more than a third when workers are grouped so that those who like each other are together, it was demonstrated.

Special linguistic talent or very high intelligence was shown to be not necessary to learn a foreign language.

Repeated failure and frightening experience will cause even an intelligent dog to stop learning, experiments showed.

Mice defeated repeatedly in fights with other mice developed "combat fatigue," a finding promising that these animals may be used in the laboratory to throw light on the causes of combat breakdown in human soldiers.

A method was devised for recording the brain waves of a patient and a motion picture of his movements on the same film.

Jerky eye movements reveal when a sleeping person is dreaming, it was observed.

Many serious highway accidents occur when the driver jams on the brakes or swerves because he "sees" an animal which is not there.

Flashing lights in the eyes and semicarbazide, a drug related to isoniazid, new TB drug, were successfully used to produce convulsions for the shock treatment of schizophrenia.

An elixir of metrazol was found to produce improvement in aged mental patients.

Science News Letter, December 19, 1953

TECHNOLOGY

One-Finger Control in Giant Chemical Factory

► WITH ONE-FINGER control the man in charge of operating the new petrochemical plant at Marcus Hook, Pa., can keep up with what is going on at every critical point in the maze of pipes, pumps, heaters and catalysts.

These devices change ordinary gasoline

into pure hydrocarbons for pinpoint use in the chemical industry. The new installation by the Sun Oil Co. has just begun operation.

Service men no longer have to climb icy ladders in winter to read control meters, or, in summer, squeeze between tanks, where reactions are taking place at 900 degrees Fahrenheit temperature. Sitting at a desk in the control heart of the new plant, the engineer uses one finger to dial station after station at the desired point on the chemical production line, noting temperatures and pressures, the crucial variables.

Meter readings from the instruments at those stations appear on the glass surface of the panel in front of him, with their messages. A glance tells him whether the chemical reactions are proceeding smoothly, or where to head off trouble before it actually has started.

Arranged to produce either high grade motor gasoline or one of two types of chemicals, the new plant uses 800,000 barrels of straight-run gasoline per month, some of which is casinghead gas. Careful regulation of temperature and pressure in reactors equipped with Houdry catalysts allows the plant to be run either for improved gasoline production or for manufacture of chemicals used for making dacron fiber or for phthalic acid, a valuable chemical of commerce.

Hydrogen, to the quantity of 13,000,000 cubic feet per day, is a by-product of the chemical operation, which produces either benzene and toluene or xylene as the main output.

Science News Letter, December 19, 1953



FINGER-TIP INDUSTRIAL CONTROL—By dialing the telephone shown on the desk, the operator at this new plant can be in touch with operations all along the production line. As he dials the different stations, the necessary meter readings appear on the instrument in the middle of the desk.

• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N. W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

CIRCLE OF THE SEASONS: The Journal of a Naturalist's Year—Edwin Way Teale—*Dodd, Mead*, 306 p., illus., \$4.00. A day by day account through the four seasons of the observations of a naturalist, giving many details that would escape all but the trained lover of nature.

THE COMMON CORE OF STATE EDUCATIONAL INFORMATION: Compiled by Paul L. Reason and others—*Gov't Printing Office*, State Educational Records and Reports Series: Handbook 1, Bulletin 1953 No. 8, 116 p., paper, 35 cents. This book includes the important item of educational information that State departments of education should have available annually.

FRONTAL LOBES AND SCHIZOPHRENIA: Second Lobotomy Project of Boston Psychopathic Hospital—Milton Greenblatt and Harry C. Solomon,

Understanding Yourself

THE MENTAL HYGIENE OF PERSONALITY

By Dr. Ernest R. Groves

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"The attempt of the book is to provide means by which the reader can come to a better understanding of himself. All emphasis is on the utilization of one's mental and physical equipment in such a way that happiness and efficiency may be realized."—*Scientific Book Club*.

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"Every chapter . . . is stimulating and helpful. It will enable the reader to acquire not only a better understanding of himself but a clearer vision of his powers and possibilities."—*New York State Dept. of Health, Health News*.

CONTENTS: I. The Human Quest—II. The Framework of the Personality—III. The Chemical Self—IV. Body Management—V. The Headquarters of the Self—VI. Our Strategic Center—VII. Our Cultural Watershed—VIII. The Scars of Childhood—IX. The Fatal Passage—X. Our Psycho Power Plant—XI. Uncovering the Hidden Self—XII. The Mind Finds Wings—XIII. The Windows of the Mind—XIV. Sex, Friend or Enemy—XV. The Supreme Fellowship—XVI. Consider the Stars—Appendix.

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TREASURY OF THE WORLD'S COINS—Fred Reinfeld—*Sterling*, 224 p., illus., \$2.95 popular edition, \$3.95 library edition. A photographic guide to many of the world's most interesting coins, with the story behind the coin and the country that issued it.

UNDERSTANDING YOUR TEEN-AGER—*Metropolitan Life Insurance Company*, 20 p., illus., paper, free upon request to publisher, 1 Madison Avenue, New York, N. Y. Written for the teen-ager as well as for his parents, this booklet points out that a child's desire for more independence as he reaches his teens is an important step toward becoming an adult.

WILD FLOWERS OF WESTERN PENNSYLVANIA AND THE UPPER OHIO BASIN—Text by O. E. Jennings, watercolors by Andrey Avinoff—*Pittsburgh University Press*, Vol. 1, 650 p., Vol. 2, 400 p., illus., \$6.00. An elaborate presentation of botanical data on more than 3,000 plants, of which the majority are native to Pennsylvania. Gorgeously illustrated in color.

Science News Letter, December 19, 1953

ENTOMOLOGY

Beetle Found After Seven Years in Hiding

► FAILURE OF California grain dealers to report an insect in their wheat, barley and oat storage warehouses seven years ago means the destructive Khapra beetle is well established in the state, H. M. Armitage, chief of the California bureau of entomology, has reported to the U. S. Department of Agriculture.

Several weeks ago, the beetle, *Trogoderma granarium*, was found in warehouses in Tulare county. This was the first reported occurrence of the beetle in the Western Hemisphere. (See SNL, Dec. 5, p. 360.) The larvae of the beetle, whitish in color with orange hairs, feed on stored grain.

Khapra beetles, however, have been undetected residents of California since 1946 because grain dealers confused it with other pests and did not notify entomologists, Mr. Armitage said.

An intensive survey was launched immediately after the discovery in November. Entomologists hoped that the beetle was a recent import and could be completely exterminated. The survey showed the beetle is well established and widespread. Mr. Armitage said the Khapra beetle must be accepted as a permanent California pest.

Science News Letter, December 19, 1953

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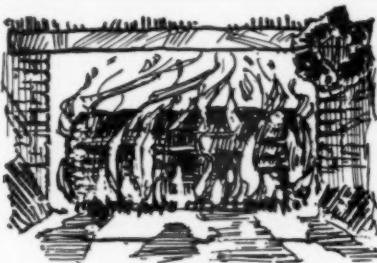
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Christmas Botany

ON THE SECULAR side Christmas is gifts and good cheer, family reunions and good companions, snow, lights, bells and Kris Kringle. And it is also the trees and plants with which we bedeck the festival.

These trees and plants form a special Christmas herbarium. In first place, of course, is the tree itself. Many of our Christmas trees are spruce. There are several kinds of spruce but they can all be told from the other evergreens by their needles. Spruce needles are short and quite stiff, and each one stands up on a sort of little pedestal by itself.

Fir trees are very often used. Their needles are softer than spruce, and somewhat curved. The Douglas fir is used quite extensively in the Northwest. Of course, the kind of tree cut for Christmas depends on the available local supply. In pine country, pine trees are the prevailing type. Unlike the spruce-fir group, pine needles are borne in little clusters of from two to five.

Mistletoe is firmly entrenched among the pleasanter frivolities of the season. Custom has endowed it with a special charm and power and, though small, it sells extremely well. So well in fact that florists now pack-

age it in little cellophane bags, complete, rumor has it, with pins for fastening to ladies' hats.

Botanically, mistletoe is a parasitic plant which grows not in the soil but on trees, deriving much of its sustenance from them. However much foresters, like other men, may value mistletoe at Christmas time as a subterfuge for kissing, their year 'round professional view of it is as a plant pest that saps, and sometimes dwarfs and kills, the trees it feeds on.

Honored in a different way are holly and poinsettia. Of the two, holly is the older as a Christmas plant. But when this evergreen became threatened with extinction as our expanding population created an ever-increasing demand for it, a substitute was sought. Poinsettia, which had been in use as a Christmas plant in California, was readily seized upon. Both are desired for their attractive display of the season's colors.

The Yule log, while in no sense a botanical species, deserves some notice, if only for its antiquarian interest. The disappearance of the Yule log can be attributed to two things: the clearing of the great forests, and central heating. In olden times the custom was to hunt up the biggest log to be found. It was usually oak. Cut as generously as possible so it would still fit the fireplace, it was then set in place at the back of the fire to burn unattended during the days of prolonged revelry.

Great oaks are rare and fireplaces are more so. When Christmas comes, no special effort is needed to keep the house cozy. The furnace is stoked or the thermostat set just as on any other winter day. The nearest thing to the Yule log custom is an act that has become traditional on Christmas Day among folk who live in apartment houses. That is the Christmas gift to the superintendent.

Experience has shown that if the donation be large enough, the house will be snug well into the New Year.

Science News Letter, December 19, 1953

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Questions

CYTOTOLOGY—What is DNA? p. 387.

□ □ □

FORESTRY—What are advantages to the farmer of growing Christmas trees? p. 386.

□ □ □

GENERAL SCIENCE—Of what is Jupiter's atmosphere composed? p. 388.

When does blood start circulating through the lungs of baby lambs? p. 389.

□ □ □

Photographs: Cover, Piasecki Helicopter Corp.; p. 390, Dravo Corporation; p. 393, Edgerton, Germeshausen & Grier, Inc.; p. 394, Fremont Davis; p. 395, Bell Telephone Laboratories; p. 397, Sun Oil Company; p. 400, Reynolds Metals.

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• New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D.C., and ask for Gadget Bulletin 705. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

• **DUST HOOD** for industry is made of a lightweight cloth and comes complete with a large "picture window" that does not restrict the workman's vision. Weighing only five ounces, the hood is designed for wear where irritating dusts are a nuisance. It can be worn with a respirator.

Science News Letter, December 19, 1953

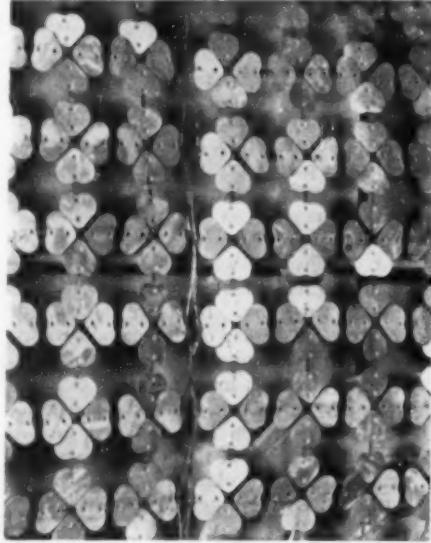
• **PEN-SIZED OILER** somewhat resembles a hypodermic syringe in that it has a visible oil supply and a long needle-like beak. It deposits its fine, light oil in out-of-the-way oil holes of movie cameras, electric shavers, fishing reels, sewing machines and fans.

Science News Letter, December 19, 1953

• **SWEDISH TYPEWRITER** has a magnesium carriage attached to its otherwise steel frame. The carriage thus is made lighter and easier to throw back. Extra keys have been added for symbols of the customer's choice not usually found on typewriter keyboards.

Science News Letter, December 19, 1953

• **ACOUSTICAL "FISH NET"** is made of heart-shaped scraps of aluminum strung on sturdy strings, as shown in the photo-



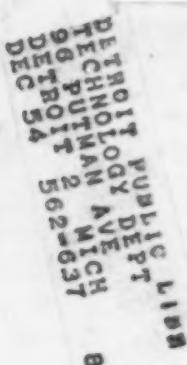
graph. Draped from the ceiling of theaters, concert halls, museums and libraries, the netting is designed to eliminate unwanted echoes by breaking them into small sound waves that are scattered in all directions.

Science News Letter, December 19, 1953

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• **READING PACER** is an electric machine designed to help you improve your reading speed. A narrow strip of light descends over a page of almost any book, magazine or other reading material. It can be made to descend at different speeds. The device plugs into ordinary household electrical outlets and can be used on small tables.

Science News Letter, December 19, 1953

• **MIDGET FLASHBULB** has a base about the size of a Christmas tree light and is rated at 4,000 lumen-seconds. Billed as the "world's smallest," the inexpensive flashbulb provides enough light for box-type cameras to snap good black-and-white pictures on fast film at distances of 15 feet from the subject.

Science News Letter, December 19, 1953

• **SPRING WINDOW WEIGHTS**, installed in grooved sashes quickly and easily with a hammer, have been designed to replace conventional weights. Housed in rugged butyrate plastic tubes, the devices are designed to give equalized sash-balance throughout the run of the window.

Science News Letter, December 19, 1953

• **NEW HIGH-FIDELITY** turntables being manufactured by one company come equipped with a built-in stroboscopic speed-measuring device. The stroboscopic unit permits the user to set the record playing speed exactly at 78, 45, 33 1/3 or 16 2/3 revolutions per minute, thus obtaining exact reproduction of musical pitch, tempo and timbre of the selection as it was recorded.

Science News Letter, December 19, 1953

Do You Know?

An auger-type coal mining machine has been developed that extracts coal for a distance of more than 200 yards into a mountain-side without requiring the presence of a single workman underground.

Few centipedes have as many as 100 legs; the common house type has only 15 pairs, the garden variety has 21 pairs, but some species have as many as 200 legs.

Although the squirrel monkey possesses a brain that is proportionately larger than man's, the animal is not particularly intelligent.

Diving on its prey, a duck hawk often travels 180 miles an hour.

About 5.5 pounds of rice per person per year are consumed in the United States.